Comparing species-specific activity of midwestern bats between smooth and stop/start mobile survey methods

Mikko Moy, Kiara Johnson, Laura D'Acunto, Benjamin Pauli, Patrick Zollner
Department of Forestry and Natural Resources. Purdue University, West Lafayette, Indiana
moym@purdue.edu

INTRODUCTION

- It's important to determine which methods are most efficient for sampling bats as new methods are formed and new technologies become available in the future (Milne et al. 2004)
- Ultrasonic detectors have increasingly become an important tool to assess multiple facets of bat ecology (Roadhouse, Vierling, and Irvine 2011; Walters et al. 2012)
- IN has 3 bat species that are endangered and 9 species that threatened
- Through better understanding and implementation of ultrasonic detectors, we can improve our assessment of bat species status

Purpose

- Compare the species-specific activity between two methods of conducting mobile acoustic surveys
- First objective was to record bat calls with our two different methods
- Second objective was to determine which method provided more data

Hypotheses

- We predicted that we would collect more bats calls and achieve higher species activity using the stop-start method than the smooth method.

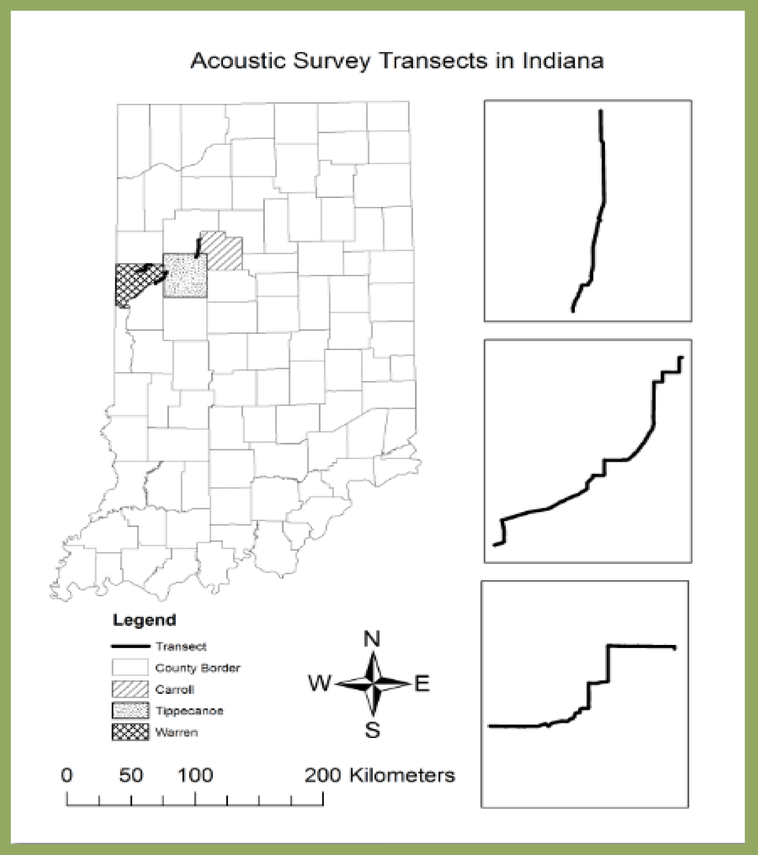


Figure 1. Location of routes in counties of Indiana, United States. Routes were plotted in 3 counties: Carroll, Tippecanoe, and Warren.

Lasiurus borealis call
Photo taken by Mikko Moy

Perimyotis subflavus call
Photo taken by Mikko Moy

METHODS

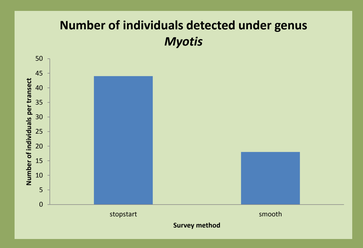
- 3 routes in 3 counties of IN (Carroll, Tippecanoe, and Warren) (Figure 1.)
- Transects spanned a variety of landscapes
  - Forests dominated by oak and hickory species
  - Agricultural fields
  - Linear water systems (stream and creeks)
- Conducted 6 transects, 2 per route each night
- Mapped out each transects from west to east to account for changes in bat activity over course of study
- Recorded calls with ANABAT SD1 bat detector using a truck
- 2 methods: stop-start method paused for 1 minute every half mile; smooth method drove continuously throughout transect
- Visually identified calls using ANALOOK program on DOSBox
- Requirements for call classification:
  - ≥ 5 pulses
  - Only 1 species per call
  - Grouped all calls from *Myotis* species into a single group

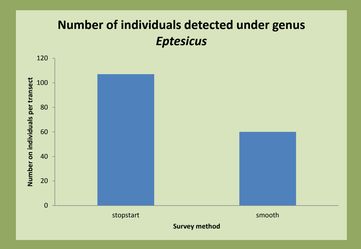
RESULTS

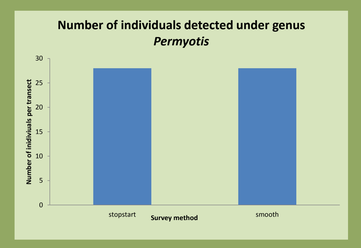
- Stop-start recorded 414 calls; smooth recorded 174 calls
- Detected calls from the following genuses:
  - *Eptesicus*
  - *Lasionycteris*
  - *Lasiurus*
  - *Myotis*
  - *Perimyotis*
- MANOVA documented no significance difference between survey method and time of night across all bat species together
- However, GLM documented several significant relationships when analyzed by genus
- *Myotis* and *Lasiurus* displayed significant difference between survey method of 0.00218 and 9.23 E-06 respectively
- *Eptesicus* showed significant values to both survey method of 0.00183 and time of night (early v. late) of 1.95 E-05

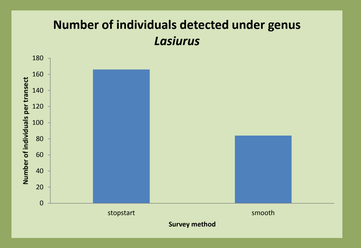
Table 1. Number of calls from each genus recorded by each sampling method.

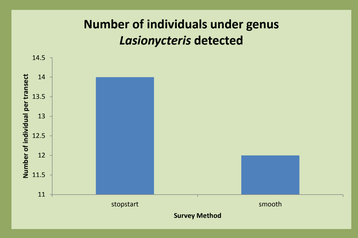
Genus	Stop-Start	Smooth	Total number of calls
Eptesicus	122	47	169
Lasionycteris	13	12	25
Lasiurus	198	72	270
Myotis	47	15	62
Perimyotis	27	24	51
Unknown	7	4	11
Total	407	170	-











DISCUSSION

- Stop-start method recorded more calls overall (Table 1)
- Used rigid requirements to identify bat calls
  - May be a crucial factor in what method is used in the field
- Location of routes may have detected certain bats more than others based on their physiology
  - Wing loading
  - Frequency of calls
  - Body size
- Larger bat species tend to forage in less cluttered spaces while smaller bat species tend to forage in more cluttered spaces
  - Open spaces can have higher detection of large bats and closed spaces may detect small bats more often
- Stop-start method did not yield a higher species – specific activity for every genus
  - Stop-start recorded calls by *Eptesicus, Lasiurus*, and *Myotis,* statistically more frequently than smooth routes
  - Recommend using stop-start if these species are of particular interest in a study
- Stop-start and smooth recorded almost same number of calls for *Lasionycteris* and *Perimyotis* genus
- Smooth can be useful in interest of time and if a study were assessing for species presence or absence
- Time of night can be helpful in predicting when species-specific activity will be the most active for *Eptesicus*, *Lasiurus*, and *Myotis*

ACKNOWLEDGEMENTS

We would like to thank Purdue University's Department of Forestry and Natural Resources. Thank you to the professors, graduate students, and volunteers for making this project possible.